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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,976	06/29/2001	Ik Soo kim	8733.437.00	6152

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MCKENNA LONG & ALDRIDGE LLP
1900 K STREET, NW
WASHINGTON, DC 20006

EXAMINER

KIELIN, ERIK J.

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 04/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/893,976

Applicant(s)

KIM, IK SOO

Examiner

Erik Kielin

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Liquid crystal display with transistors having S-shaped channel region delineated by source/drain electrodes having protrusions.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claims 1 and 11 each recites the limitation "the other electrode." There is insufficient antecedent basis for this limitation in the claim. The claims recite "source electrode," "drain electrode," and "gate electrode." It is unclear, as presently written, as to which electrode "the other electrode" refers.

For the purposes of patentability the claims will be interpreted in light of the specification and the figures. The remaining claims are rejected for depending from the above rejected claims.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-10 and 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (APA) in view of JP 2-58030 A (**Taniguchi et al.**).

Regarding claims 1 and 11, **Taniguchi** discloses a liquid crystal display device and method of manufacturing the device comprising forming each of the following:

a gate electrode **6** on a substrate **1**; a gate insulating film **12** on the substrate **1** and over the gate electrode **6**; a semiconductor layer **14** on the gate insulating film **12** and over the gate electrode **6**; a source electrode **8** and a drain electrode **10** on the semiconductor layer **14** and adjacent the gate electrode **6**, wherein; a protective layer **18** on the gate insulating film **12** and over the source and drain electrodes **8**, **10**; and a pixel electrode **22** on the protective layer **18**. (See instant specification, paragraphs [0003]-[0013] and Figs. 1 through 3E.)

APA does not teach that the source electrode and the drain electrode each include at least one protrusion that extends toward the other electrode.

Taniguchi teaches a liquid crystal display and method of manufacturing the display wherein the source electrode **SD2** and the drain electrode **SD1** each include at least one protrusion **d1** that extends toward the other electrode in order to beneficially increase the channel width of the transistor. (See Abstract and Figs. 1 and 2.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the source/drain electrodes having protrusion of **Taniguchi** as the source/drain electrodes of **APA** in order to beneficially increase the channel width of the transistor, which enables reduction of the TFT size and improves the aperture rate, as taught by **Taniguchi** (Abstract.)

Regarding claims 2 and 12, **APA** does not indicate that the semiconductor layer includes a "2"-shaped channel, but **Taniguchi** shows that the channel is "2"-shaped.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use a "2"-shaped channel as the channel of **APA** to increase the channel width as taught by **Taniguchi**.

Regarding claims 3 and 13, **APA** discloses the active layer **14** on the gate insulating film **12**; and the ohmic contact layer **16** on the active layer **14**.

Regarding claims 4 and 14, **APA** teaches that the ohmic contact layer **16** contains an opening corresponding to the channel **24** (Fig. 3C; paragraph [0009] --especially the last two sentences), but does not teach that the channel is "2"-shaped.

Taniguchi shows that the channel is "2"-shaped.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use a "2"-shaped channel as the channel of **APA** to increase the channel width as taught by **Taniguchi**.

Regarding claims 5, 6, 15, and 16, **APA** discloses that the active layer is undoped silicon and the ohmic contact layer is doped silicon (instant specification, p. 4, paragraph [0008]).

Regarding claims 7 and 17, the **APA** discloses that standard channel width is about 25 μm (instant specification, p. 3, paragraph [0005]), but does not teach a channel width of greater than 50 μm .

Tanaguchi does not indicate the width of the channel but indicates that the width should be increased. Also the **Tanaguchi** Fig. 1 shows that the channel width is more than doubled by comparing a source/drain electrodes without protrusions to those source/drain electrodes **SD2**, **SD1**, with protrusions **d1** the same manner as presently proposed in the instant invention.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to width the channel width of **APA** to greater than 50 μm by forming the protruding portions of the source/drain electrodes of **Tanaguchi** on those source/drain electrodes of **APA** because **Tanaguchi** teaches that the channel width should be longer than in the absence of such protrusions and shows geometrically that the width of the channel is more than doubled. Moreover, these claims are *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious). In the instant case, the result of forming the protrusions on the source/drain electrodes expectedly increases the channel width as clearly taught by **Tanaguchi**.

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Regarding claims 8 and 18, **APA** discloses that the channel extends only over the gate electrode 6.

Regarding claims 9 and 19, **APA** discloses that the pixel electrode 22 contacts the drain electrode 10 through an opening 20 in the protective layer 18 (Fig. 3E).

Regarding claims 10 and 20, **APA** discloses that the data line 4 is in electrical communication with the source electrode 8 (Fig. 3E).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 5,777,703 (**Nishikawa**), US Reissue 33,829 (**Castleberry**), and US 6,509,946 B1 (**Kodate**; col. 5, lines 9-26) each teach forming LCDs having source/drain electrodes with protrusions directed toward the each other to increase the channel width of the transistor.

US 5,789,791 (**Bergemont**) and US 6,239,468 B1 (**Chang et al.**) each teach TFTs having source/drain electrodes with protrusions directed toward the each other to increase the channel width of the transistor.

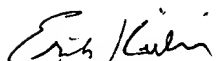
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 703-306-5980. The examiner can normally be reached on 9:00 - 19:30 on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 703-308-4940. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Erik Kielin
March 25, 2003